BULLETIN OF MARINE SCIENCE, 51(1): 45–65, 1992

COMMENTS ON THE GENUS *LEPIDOTRIGLA* (PISCES: TRIGLIDAE) WITH DESCRIPTIONS OF TWO NEW SPECIES FROM THE INDIAN AND PACIFIC OCEANS

William J. Richards

ABSTRACT

Recently collected specimens of the triglid genus *Lepidotrigla* from the western Indian Ocean reveal the presence of a new species from the Saya de Malha Bank and provide additional information on the characters and distribution of several rare species—*L. multispinosa, L. alcocki, L. bentuviai,* and *L. omanensis.* A key to these western Indian Ocean species is included. Also a single specimen from the central Pacific Ocean is described as new. Additional analysis of these species and others provides new information on the genus *Lepidotrigla.*

The fishes of the genus *Lepidotrigla* are generally small (<200 mm SL) and are commonly called gurnards or sea robins. They range throughout the temperate and tropical waters of the eastern Atlantic, Indian, and western Pacific oceans. They are the most speciose genus of triglids with around 60 nominal forms. The species of the eastern Atlantic are well known (Richards and Saksena, 1991), but the number of species and relationships is unclear elsewhere as described herein.

Richards and Saksena (1977) revised the genus *Lepidotrigla* from the western Indian Ocean. Since that study, I have obtained additional specimens of triglids chiefly from Russian research vessels and some from the Smithsonian Oceanographic Sorting Center. Among these materials was an undescribed species from the Saya de Malha Bank plus twelve specimens of *L. alcocki* previously known only by its two type specimens from that bank. Additional specimens of *L. multispinosa, L. bentuviai,* and *L. omanensis* provide new distribution data and the added specimens allowed the clearing and staining of a few which provide new data on the osteological characters. Richards and Saksena (1977) discussed the genus and noted the difficulty of diagnosing it because of the large number of species which occur from the coast of the eastern Atlantic from Europe and the Mediterranean to Angola, throughout the tropical waters of the Indian Ocean from southern Africa to Australia, and in the western Pacific from southern Australia northward to Japan. The genus is unknown from the central Pacific, but in reviewing specimens in the Bishop Museum I found a single specimen from the Line Islands which is described here as new. The genus is probably represented throughout this area, but so little trawling has been done on the deep, rugged shelves (>100 m) of these Pacific islands that our knowledge is limited. For example, one specimen of the triglid genus *Chelidonichthys* was taken in Hawaii in 1922 (Pietschmann, 1930, although the Bishop Museum specimen label says collected in 1926) and none since then despite extensive trawling by the National Marine Fisheries Service in Hawaiian waters.

For this study species accounts are provided to account for the new information, a revised key to species from the western Indian Ocean to include the new taxon is presented, and information is given toward a better understanding of the genus *Lepidotrigla.*

METHODS AND MATERIALS

Counts and measurements follow Richards and Saksena (1977) with one important exception. In that work and other published work by us or by me, standard length was measured from the anterior

tip of the first infraorbital bone (rostral process) to the base of the caudal fin rays. This gave an accurate basis for length as most of the species involved had rather short first infraorbital spines. Now that studies are expanding to other species, some with very long first infraorbital spines, the anterior point for measuring standard length is changed to the anterior edge of the premaxillary bones at their symphysis. All standard length measurements follow this new definition. Head length is also measured from the edge of the premaxillary bones to the posterior opercular margin or flap, not the opercular spine tip. The opercle length is measured from the anterior edge of the bone to the tip of the opercular spine. Opercular spine length is from the posterior opercular margin to the tip of the spine. Another measurement which may cause confusion is the length of the cleithral spine. I have always measured this from the anterior edge of the cleithrum to the tip of the spine along the axis of the trunk, but some authors measure this from the posterior edge of the opercle to the tip of the spine. My method using the width of the cleithrum more accurately depicts this character. Caudal fin counts cause some confusion and are difficult to make. Principal caudal rays by most definitions are those articulating with the parhypural and hypural bones. This can be readily determined on radiographs and in cleared and stained material. It is not possible to make this determination on preserved material as principal rays are the branched plus upper and lower first unbranched ray [the Hubbs and Lagler (1958) definition]. This is very difficult to determine in triglids; thus I only record counts from radiographs and cleared and stained specimens as defined above.

The specimens used in this study are listed in each species account and museum abbreviations follow Leviton et al. (1985). The new material has been widely dispersed to museums actively engaged in triglid studies through the generous suggestion of the collecting agencies.

Key to the Species of *Lepidotrigla* from the Western Indian Ocean

1a. Rostral process with a prominent blade-like spine which is much larger than other rostral spines 2
1b. Rostral process with several prominent spines, largest not much larger than other spines 6

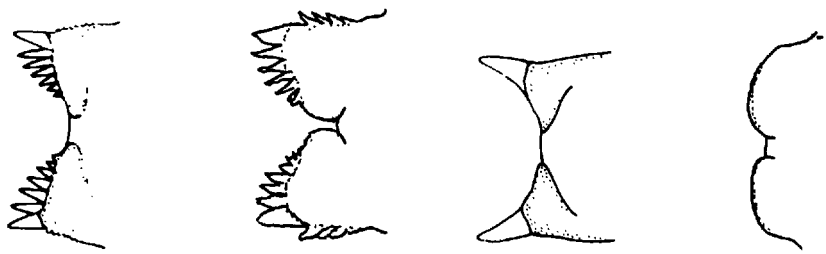

Figure 1. Condition of the types of rostral spines (first infraorbital bone) in the genus *Lepidotrigla*.

2a. Opercular spine long, extends posterior to upper margin of cleithral spine base ..... *L. sayademalha*
2b. Opercular spine short, barely extends posterior of opercular posterior margin 3
3a. Belly not fully scaled ..... *L. bentuviai*
3b. Belly fully scaled 4
4a. Scales very loosely attached in uneven indistinct rows ..... *L. riggsi*
4b. Scales firmly attached in even distinct rows 5
5a. Ten to 14 (usually 12) scale rows below the lateral line; interorbital width 7.3–8.9% SL; head length 38.2–43.1% SL ..... *L. omanensis*
5b. Fifteen to 19 (usually 18) scale rows below the lateral line; interorbital width 4.8–8.2% SL, head length 31.5–41.7% SL ..... *L. bispinosa*
6a. Rostral process projects as a curved process with no prominent spines 7
6b. Rostral process with several prominent spines 8
7a. Preopercular ridge strong ..... *L. multispinosa*
7b. Preopercular ridge weak to absent ..... *L. alcocki*
8a. Scale rows below the lateral line 19 to 21 ..... *L. spiloptera*
8b. Scale rows below the lateral line 12 to 16 ..... *L. faueri*

SPECIES ACCOUNTS

Lepidotrigla sayademalha new species
Figures 2, 3 and Tables 1–5

Diagnosis.—A species of *Lepidotrigla* with a prominent blade-like projection of the rostral process; opercular spine long, extending posterior to the upper margin of the cleithral spine base; pectoral fin of moderate length (43–52% SL); scales weakly attached; nape scaled, belly fully scaled; breast and interpelvic area naked; 55–60 lateral-line scales, 23–25 scale rows below the lateral line; 8–9 first dorsal fin spines; 13–15 second dorsal fin rays; 13–14 anal fin rays; 30 vertebrae; head length moderate (32–37% SL); interorbital wide (6.5–8.0% SL).

Holotype.—USNM 322084, 103.7 mm SL, Indian Ocean, Saya de Malha Bank, 10°49'S, 062°22'E, 10 October 1977, R/V PROFESSOR MESIATZEV, Tr. 498, 115 m.

Paratypes.—HUMZ 73191 (98.2 mm SL), Indian Ocean, Saya de Malha Bank, 10°48'S, 060°55'E, 4 September 1977, 125 m. All the following were taken in the same collection as follows: Indian Ocean, Saya de Malha Bank, 10°17.5'S, 061°12.3'E, 20 May 1976, R/V ZVEZDA KRYMA Cr. 6, Tr. 6, 50–60 m. USNM 322085, 2[70.2(cleared and stained)–94.5 mm SL]; MMSU P-18830, 3(73.9–91.8 mm SL); BMNH 1992, 3.25.31, 1(83.7 mm SL); MNHN 1992-217, 1(76.1 mm SL); MCZ 98707, 1(69.4 mm SL); AMS I32704-001, 1(75.0 mm SL); NMV A9960, 1(64.6 mm SL); LACM 45538-1, 1(75.2 mm SL); CAS 77306, 1(71.8 mm SL); RUSI 37573, 1(73.7 mm SL); FAKU 58826, 1(83.9 mm SL).

Description.—Measurements for the holotype and paratypes are given in Table 1. Meristic characters are given in Tables 2 to 5. Rostral spines long (4.6–6.7% SL) with a few small spines at base; nuchal spine long extending posteriorly along first dorsal fin base; opercular spine very long extending posteriorly to upper margin of cleithral spine base; cleithral spine very long (17.5–20.9% SL); preopercular spine absent and no preopercular ridge present; first three dorsal spines serrate; 21 to 22 bucklers (modified proximal pterygiophores) along base of first and second dorsal fins with first two or three not bearing posteriorly directed spines; 6–8 short (1.5–2.6 mm) rakers on ceratobranchial bone of first gill arch; a few small ctenoid scales on nape of holotype, paratypes lack nape scales; prepectoral, breast, interpelvic area scaleless; belly scaled. Pectoral fin moderate extending to middle of anal fin with 11 joined and 3 free rays. The following data from the cleared and stained specimen USNM 322085; caudal fin with lateral line bifurcate on base and with 10 secondary dorsal rays, 7 dorsal and 6 ventral principal rays, and 11 ventral secondary rays; first two neural spines short and close together; Baudelot's ligament originating on anterior edge of first vertebra; first dorsal pterygiophore inserting between neural spines of 2nd and 3rd vertebrae, next two interdigitating between 3rd and 4th vertebrae, remaining pterygiophores interdigitating singly with the exception of 14th and 15th which interdigitate between 14th and 15th vertebrae. Ninth pterygiophore with no discernible dorsal

Figure 2. Lateral view of the holotype of *Lepidotrigla sayademalha* USNM 322084, 103.7 mm SL.

Figure 3. Dorsal view of the head of the holotype of *Lepidotrigla sayademalha.*

fin spine. First two anal pterygiophores inserting anterior to haemal spine on 12th vertebra and remaining interdigitating singly. First closed haemal arch on 9th vertebra. First and 2nd hypural fused, 3rd and 4th hypurals fused, 5th hypural free. Three epurals. Vertebrae 11+19=30. Teeth present on 5th left and right ceratobranchials, these bones not fused. Uncinate process on first epibranchial; 2nd, 3rd, and 4th infrabranchials with teeth. Third and 4th epibranchials joined by a process; 4th basibranchial not ossified. Scapular foramen entire.

Color.—No black blotch in first dorsal fin; inner area of pectoral fin with black interior and light margin. Color photo of HUMZ 73191 specimen depicting dark red blotch on first dorsal, body pale red or pink.

Etymology.—The name is a noun in apposition formed by the combined name of the type locality.

Discussion.—The new species is found at shallower depths (50–115 m) than *L. alcocki* (150–260 m), the other triglid recorded from this bank. It is a distinct species as not other western Indian Ocean species of *Lepidotrigla* has a long opercular spine. It is probably related to the other *Lepidotrigla* species with the blade-like rostral process (type P), but until all species can be thoroughly examined and diagnosed it is premature to comment on intrageneric relations.

Lepidotrigla bentuviai Richards and Saksena, 1977
Tables 2–5

Lepidotrigla bentuviai Richards and Saksena 1977: 208–222 (original description, key, illustration). Richards 1984: unpaginated (illustration, characters, distribution).

New Material.—MMSU P12338, 2(74.1–151.4 mm SL), Indian Ocean, Arabian Sea, coast of Oman, 17°55′N, 057°01′E, 13 January 1966, R/V Ak. Knipovich Tr. 305. MMSU P-18833, 1(69.1 mm SL), Indian Ocean, Gulf of Aden, Djibouti Point, 12°02′12″N, 050°48′30″E, 14 January 1987, M/V Beinta Cr. 18, St. 18, 150 m. MCZ 98708, 1(105.6 mm SL), Indian Ocean, Gulf of Aden, Djibouti Point, 11°16′18″N, 051°15′36″E, 5 February 1987, M/V Beinta Cr. 19, St. 6, 57–59 m. The following were all collected with the preceding specimen: MNHN 1992-218, 1(82.7 mm SL), LACM 45539-1, 2(87.7–95.9 mm SL); CAS 77307, 2(84.8–98.5 mm SL); AMS I323705-001, 2(97.1–109.2 mm SL); NMV A9961, 2(106.0–110.6 mm SL); RUSI 37574, 2(98.1–101.2 mm SL); FAKU 58827, 2(82.9–86.3 mm SL); USNM 322086, 2(85.6–90.4 mm SL), both specimens cleared and stained.

Discussion.—The new material provides an opportunity to disperse specimens to additional museums. Data from the cleared and stained specimens are given in

Table 1. Measurements in mm and % SL of *Lepidotrigla sayademalha* new species

Character	Holotype															
	USNM 322084	HUMZ 73191	USNM 322085	MMSU P-18830	FAKU 58826	BMNH 1992. 3.25.31	MMSU P-18830	MNHN 1992-217	LACM 45538-1	AMS I32704-001	MMSU P-18830	RUSI 37573	CAS 77306	USNM 322085	MCZ 98707	NMV A9960
SL	103.7	98.2	94.5	91.8	83.9	83.7	81	76.1	75.2	75	73.9	73.7	71.8	70.2	69.4	64.6
Rostral process length	6.0	4.1	3.0	6.2	5.4	4.8	—	3.8	3.5	4.3	5.3	4.0	3.9	2.6	3.2	3.3
% SL	5.8	4.2	3.2	6.8	6.4	5.7	—	5.0	4.7	5.7	7.2	5.4	5.4	3.7	4.6	5.1
Head length to flap	33.8	32.6	30.8	31.2	28.9	27.5	26.3	26.2	24.8	26.6	24.9	24.8	26.7	25.0	26.6	22.2
% SL	32.6	33.2	32.6	34.0	34.4	32.9	32.5	34.4	33.0	35.5	33.7	33.6	37.2	35.6	38.3	34.4
Head depth	24.9	23.5	25.0	24.6	23.5	20.2	21.1	19.8	19.6	19.0	19.3	18.6	22.4	19.5	17.9	18.1
% SL	24.0	23.9	26.5	26.8	28.0	24.1	26.0	26.0	26.1	25.3	26.1	25.2	31.2	27.8	25.8	28.0
Body depth	25.8	26.1	25.9	24.7	23.8	21.4	21.5	21.0	21.1	20.7	21.0	20.6	21.8	19.3	19.5	19.0
% SL	24.9	26.5	27.4	26.9	28.4	25.6	26.5	27.6	28.1	27.6	28.4	28.0	30.1	27.5	28.1	29.4
1st dorsal spine length	15.3	11.8	—	13.7	—	11.9	12.6	10.8	11.3	11.1	—	10.3	12.1	11.6	11.3	—
% SL	14.8	12.0	—	14.9	—	14.2	15.6	14.2	15.0	14.8	—	14.0	16.9	16.5	16.3	—
2nd dorsal spine length	18.7	16.3	15.6	16.7	15.3	14.3	13.5	—	12.7	13.3	14.7	13.3	13.5	13.4	13.0	12.2
% SL	18.0	16.5	16.5	18.2	18.2	17.1	16.7	—	16.9	17.7	19.9	18.0	18.8	19.1	18.7	18.9
3rd dorsal spine length	21.0	18.0	18.6	19.7	17.2	15.7	16.5	12.9	15.1	13.9	—	14.5	15.0	14.2	14.2	14.2
% SL	20.3	18.3	19.7	21.5	20.5	18.8	20.4	17.0	20.1	18.5	—	19.7	20.9	20.2	20.5	22.0
Orbit diameter	9.5	8.8	8.8	8.7	8.5	7.9	7.8	7.1	7.2	7.4	6.8	7.4	7.0	6.9	6.6	6.7
% SL	9.2	9.0	9.3	9.5	10.1	9.4	9.6	9.3	9.6	9.9	9.2	10.0	9.7	9.8	9.5	10.4
Interorbital width	8.4	7.1	6.7	7.0	6.8	5.8	6.1	5.6	5.3	5.5	5.9	5.4	—	5.2	4.6	4.7
% SL	8.1	7.2	7.1	7.6	8.1	6.9	7.5	7.4	7.0	7.3	8.0	7.3	—	7.4	6.6	7.3
Head length to spine tip	40.6	39.7	39.9	39.6	35.5	33.7	30.7	30.3	29.3	30.6	28.9	29.9	30.8	30.1	30.1	28.1
% SL	39.2	40.4	42.2	43.1	42.3	40.3	37.9	39.8	39.0	40.8	39.1	40.6	42.9	42.9	43.4	43.5
Opercle length	14.8	14.8	14.7	14.7	13.1	12.0	11.4	9.8	10.3	11.2	10.4	10.7	11.1	10.3	9.3	10.7
% SL	14.3	15.1	15.6	16.0	15.6	14.3	14.1	12.9	13.7	14.9	14.1	14.5	15.5	14.7	13.4	16.6
Cleithral spine length	20.9	15.9	17.7	17.0	15.4	14.5	16.9	13.3	13.4	14.8	13.7	13.7	14.2	13.2	14.5	12.0
% SL	20.2	16.2	18.7	18.5	18.4	17.3	20.9	17.5	17.8	19.7	18.5	18.6	19.8	18.8	20.9	18.6
Pectoral fin length	48.4	49.1	46.2	48.0	38.5	40.0	39.8	33.0	34.4	36.5	37.2	33.2	35.6	31.2	30.2	30.6
% SL	46.7	50.0	48.9	52.3	45.9	47.8	49.1	43.4	45.7	48.7	50.3	45.0	49.6	44.4	43.5	47.4
Pelvic fin length	31.5	27.8	29.4	29.0	25.8	25.0	24.9	22.3	22.8	22.3	23.3	23.8	22.9	21.3	22.2	19.5
% SL	30.4	28.3	31.1	31.6	30.8	29.9	30.7	29.3	30.3	29.7	31.5	32.3	31.9	30.3	32.0	30.2
Caudal peduncle depth	6.8	6.4	5.9	7.1	6.2	5.4	6.2	5.1	5.3	5.6	5.2	5.3	5.0	4.8	4.4	4.2
% SL	6.6	6.5	6.2	7.7	7.4	6.5	7.7	6.7	7.0	7.5	7.0	7.2	7.0	6.8	6.3	6.5

Table 2. Counts of spines and rays of the dorsal fin in some of the species of *Lepidotrigla* from the western Indian Ocean. Revised in part from Richards and Saksena (1977)

	Dorsal fin spines					Second dorsal fin rays						
	8	9	10	N	Mean	13	14	15	16	17	N	Mean
omanensis	34	208	1	252	8.5	61	149	32			243	13.9
bentuviai	17	7		24	8.3		15	9			24	14.4
alcocki		19	1	20	9.1			2	18		20	15.9
multispinosa	2	7		9	8.8				9		9	16.0
sayademalha	4	12		16	8.8	1	13	1			14	14.0

Tables 2 to 5. Baudelot's ligament originates on the posterior edge of the skull, rather than the anterior edge of the first vertebrae as is the case with most *Lepidotrigla*. The only specimen with 29 vertebrae has 12 trunk and 17 caudal vertebrae, but the pterygiophore-neural spine interdigitation pattern is different in that the first two pterygiophores are inserted between the second and third neural spine and the next pterygiophores are inserted singly between the following neural spines except between the 13th and 14th neural spines where two pterygiophores are inserted (the usual case). In the other specimen with 31 vertebrae (12+19), the first pterygiophore is inserted between the second and third neural spine and the next two pterygiophores are inserted between the third and fourth neural spines (the usual case). The other double insertion occurs between the 13th and 14th neural spines (the usual case). The last first dorsal pterygiophore has no visible spine associated with it in either specimen, but a spine remnant may be present though too small to be seen. The first closed haemal arch is located on the 10th vertebra. Three epurals are present, hypurals 1 and 2 are fused, hypurals 3 and 4 are fused, and hypural 5 is free.

Lepidotrigla omanensis Regan, 1905
Tables 2–5

Lepidotrigla omanensis Regan 1905: 324 (original description). Norman 1939: 96 (distribution, comments). Blegvad 1944: 194–195 (misidentification, incorrect synonymization of *L. bispinosa* and *L. omanensis*). Richards and Saksena 1977: 208–219 (key, characters, diagnosis, distribution). Richards 1984: unpaginated (illustration, characters, distribution).

New Material.—All from the Indian Ocean, Gulf of Aden, Somalia: USNM 322087, 2(85.7–88.4 mm SL, cleared and stained), near Ras Salbal, 10°50′53″N, 043°57′55″E, 5 September 1986, M/V BEINTA Cr. 14, St. 2, 203 m. MMSU P-18831, 2(98.9-99.7 mm SL) collected with the preceding specimen. LACM 45540-1, 2(95.5–102.4 mm SL) collected with the preceding specimen. RUSI 37575, 1(109.3 mm SL) 17 km ESE of Mait, 11°13′54″N, 047°39′19″E, 9 September 1986. M/V BEINTA Cr. 14, St. 9, 78 m. MNHN 1992-219, 1(85.0 mm SL) collected with the preceding specimen. FAKU 58828, 1(78.6 mm SL), near Khoreh, 11°12′00″N, 048°02′24″E, 7 January 1987, M/V BEINTA Cr. 18, St. 3, 335 m. AMS I32706-001, 3(76.3, 84.7, 85.8 mm SL), at Habo, 11°43′42″N, 050°28′48″E, 17 January 1987, M/V BEINTA Cr. 18, St. 24, 160 m. NMV A9962, 2(99.1–127.1 mm SL), near Ras Salbal, 10°51′40″N, 043°56′35″E, 6 September 1986, M/V BEINTA Cr. 14, St. 4, 258–326 m.

Discussion.—The new material provides an opportunity to disperse specimens to additional museums. Data from the cleared and stained specimens are given in Tables 2 to 5. Baudelot's ligament originates on the anterior edge of the first vertebra and the pterygiophore insertion pattern is the usual case for *Lepidotrigla*. The first closed haemal arch is on the 10th vertebra. The two cleared and stained specimens have 30 and 31 total vertebrae with 12 trunk vertebrae in both. Hypurals 1 and 2 are fused, hypurals 3 and 4 are fused, and hypural 5 is free. Three epurals are present. The last first dorsal pterygiophore has not discernible spine

Table 3. Counts of anal fin rays and vertebrae of some of the species of Lepidotrigla from the western Indian Ocean. Revised in part from Richards and Saksena (1977)

	Anal fin rays							Vertebrae						
	13	14	15	16	17	N	Mean	29	30	31	32	33	N	Mean
omanensis	20	154	70			244	14.2	3	32	10			45	30.2
bentuviai	1	17	6			24	14.2	1	2	4			7	30.4
alcocki			1	17	2	20	16.1				2	3	5	32.6
multispinosa			1	7	1	9	16.0				1	2	3	32.7
sayademalha	1	15				16	13.9		3				3	30.0

Table 4. Characters of *Lepidotrigla* species. Synonymous species included (indented) if type material was examined. Asterisks indicate value of type specimen

	Number of vertebrae							Location of 2nd double pterygiophore inserted between vertebrae						
Species	29	30	31	32	33	34	35	9–10	10–11	11–12	12–13	13–14	14–15	15–16
abyssalis			x	1*								1*		
alata				7				1		3	5			
alcocki				2	3							2		
argus		1*										1*		
argyrosoma				1*										1*
bentuviai	1	1	4*								1	5*		
bispinosa	1	3	1								2	4		
brachyoptera														
cadmani		3*								1	1*	1		
laevispinnis														
calodactyla		1*									1*			
carolae			3*								3*			
cavillone			2	1							2	1		
deasoni			1*	1								2*		
dieuzeidei														
eydouxi														
faueri					1	1						1	1	
natalensis														
stigmapteron														
grandis			1*										1*	
guentheri			1	1							1	1		
hime		x												
japonica	x	x									1			
jimjoebob			1*									1*		
kishinouyei	x	2*	x									2*		
smithii														
kanagashira			x	x										
lepidojugulata														

Table 4. Continued

Species	Number of vertebrae							Location of 2nd double pterygiophore inserted between vertebrae						
	29	30	31	32	33	34	35	9–10	10–11	11–12	12–13	13–14	14–15	15–16
longifaciata				x	x	x								
longimana														
macrobrachia		1*									1*			
marisinensis										1*				
microptera					6	3	2			3	6	4		
modesta				1*	2	1*					1	2*		
mulhalli			1							1				
multispinosa				1	2							2	1	
oglina				1*								1*		
omanensis	3	31	10							2	25	15		
papilio														
phalaena			1*								1*			
pleuracanthica														
sphinx		1*								1*				
pectoralis							1*							1*
punctipectoralis				1*										1*
riggsi		1	2									2		
sayademalha		1*											1*	
spiloptera			3								1	1	1	
spinosa														
umbrosa			1*									1*		
vanessa														
venusta				1*							1*			

Table 5. Characters of *Lepidotrigla* species. Synonymous species included (indented), if type material was examined. Asterisks indicate value of type specimen

Species	Postorbital groove	First dorsal spine	Number lateral line scales (range)	Type specimens	Breast squamation	Dorsal spines (no.)	Type	Dorsal rays (no.)	Type	Anal rays (no.)	Type	Rostral spines type (see Key)	Body scale attachment	Black dorsal fin spot
abyssalis	present	serrate		60*	naked	8–9		14–15		14–15		L*	weak*	absent*
alata	present	serrate	60–64		naked/scaled	8–10		15–16		15–16		P	firm	absent
alcocki	present*	serrate*	62–68	65*	naked*	9–10	10*	15–16	16*	15–17	16*	M*	weak*	absent*
argus	present*	serrate*		58*	naked*		9*		14*		14*	O*	weak*	absent*
argyrosoma	present*	serrate*		61*	scaled*		10*		15*		15*	P*	weak*	absent*
bentuviai	present*	serrate*	55–61	57*	naked*	8–9	9*	14–15	15*	13–15	15*	P*	firm*	absent*
bispinosa		serrate*	53–60	56*	naked*	8–10	9*	13–15	13*	13–15	14*	P*	firm*	present*
brachyoptera	present	serrate	60–66		naked	9		15–16		16–17		O	weak	absent
cadmani	present*	smooth*	52–57	56*	scaled*	8–10	9*	13–15	14*	13–15	14*	L*	weak*	present*
laevispinnis	present*	smooth*			scaled*							L*	weak	
calodactyla	present*	serrate*	58–60	58*	naked*	9	9*	14–17	17*	14–16	16*	L*	weak*	absent*
carolae	present*	serrate*	55–60	58*	naked*	8–9	9*	14–16	14*	14–16	15*	L*	weak*	absent*
cavillone	present	serrate	54–60		naked	8–9		14–16		13–16		L*	weak	
deasoni	present*	serrate*	57–62	57*	naked*	9	9*	15	15*	14–15	14*	L*	weak*	absent*
dieuzeidei	present	serrate			naked							L*	weak	
eydouxi	present*	serrate*			naked*							P/L*		
faueri	present	serrate	56–64		naked	8–10		15–17		15–17		L*	weak	absent
natalensis	present	serrate												
stigmapteron	present*	serrate*		62*	naked*		9*		17*		17*	L*		
grandis	present*	serrate*		63*	naked*		9*		14*		14*	M*	weak*	absent*
guentheri	present	serrate	62–67	55	naked	7–9		15–17		15–17		L/M	weak	absent
hime	present	serrate	58–61	54		8–9		14–15		14–15				
japonica	present	serrate	56–60		naked	8–9		14–15		13–14		L	weak	absent
jimjoebob	present*	serrate		62*	naked*		9*		16*		16*	L*	weak*	absent*
kishinouyei	present*	serrate	61–63	63*	naked*	8–9	9*	14–16	15*	14–16	15*	L*	firm*	faint*
smithii	present*	serrate*		60*	naked*		9*		14*		14*	L*	firm*	present*

Table 5. Continued

Species	Postorbital groove	First dorsal spine	Number lateral line scales (range)	Type specimens	Breast squamation	Dorsal spines (no.)	Type	Dorsal rays (no.)	Type	Anal rays (no.)	Type	Rostral spines type (see Key)	Body scale attachment	Black dorsal fin spot
kanagashira	present	serrate	58–61		scaled	9		14–16		14–16				
lepidojugulata	present	serrate			scaled	9		15		15–16		P/L		
longifaciata	present	serrate	63–68		naked	8–9		15–17		15–17		M	weak	absent
longimana	present	serrate			scaled	9		14		14–15		P/L		
macrobrachia	present*	serrate*		54*	naked*		9*		14*		14*	P*	firm*	absent*
marisinensis	present*	serrate*		62*	naked*		9*		16*		16*	P*	firm*	absent*
microptera	absent*	serrate*	64–67	ca. 70*	naked*	8–10	9*	16–17	17*	16–17	17*	L*	weak*	present*
modesta	present*	serrate*	62	60–63*	naked*	9	8–9*	16	14–16*	17	16*	O	weak*	absent*
mulhalli	present	serrate	60		naked	9		16		16		L	weak	absent
multispinosa	present	serrate	61–64		naked	8–9		16		15–17		M	weak	absent
oglina	present*	serrate*	60		naked		9*		15*		15*	L*	firm*	absent*
omanensis	present*	serrate	52–60	57*		8–10	9*	12–15	14*	13–15	14*	P*	firm*	present*
papilio	present*	serrate*	59–60	60*	naked*		9*		14*		14*	O*	weak*	present*
phalaena	present*	serrate*		59*	naked*		9*		14*		14*	O*	weak*	present*
pleuracanthica	present*	serrate*										O*	weak*	
sphinx	present*	serrate*		59*	naked*		9*		15*		14*	O*	weak*	present*
pectoralis	present*	serrate*		76*	naked*		10*		18*		17*	O*	firm*	present*
punctipectoralis	present*	serrate*	61–64	62*	naked*	8–9	10*	15–16	15*	14–16	16*	P*	weak*	absent*
riggsi	present	serrate	57–62		naked	8–9		14–15		14–15		P	weak	absent
sayademalha	present*	serrate*	55–59	56*	naked*	8–9	8*	13–15	14*	13–14	14*	P*	weak*	absent*
spiloptera	present*	serrate*	59–65	59*	naked*	8–9	9*	15–16	15*	14–16	15*	L*	weak*	absent*
spinosa	present	serrate	51–57	57	naked	9		14–15		14–15		L	firm	present
umbrosa	present*	serrate*		60*	naked*	9	9*	14–15	15*	14–15	15*	L*	firm*	present*
vanessa	absent*	serrate*		ca. 75*	naked*		11*		17*		17*	L*	firm*	present*
venusta	present	serrate		63*	scaled	10		15		15		P	firm*	absent*

associated with it. This species is distributed over a wide depth range. In the earlier study (Richards and Saksena, 1977), depth records presented extended from 56 to 220 m, but with this new material the depth range is increased to 335 m.

Lepidotrigla multispinosa Smith, 1934
Tables 2–5

Lepidotrigla multispinosus Smith 1934: 326–328 (original description). Norman 1939: 96 (incorrectly synonymized in *Lepidotrigla spiloptera* Gunther). Smith 1949: 382 (description). De Beaufort 1962: 117 (incorrectly synonymized in *Lepidotrigla spiloptera* Gunther). Richards and Saksena 1977: 208–221 (key, characters, diagnosis, distribution). Heemstra 1982: 292 (key). Richards 1984: unpaginated (illustration, characters, distribution).

Lepidotrigla multispinosa Smith. Heemstra 1986: 487–488 (key, description, distribution).

New Material.—USNM 322088, 1(148.3 mm SL, cleared and stained). Indian Ocean, Somalia, Bandar Beila, 09°04′42″N, 050°51′30″E, 14 February 1987, M/V BEINTA Cr. 19, St. 24, 327–333 m. AMS I32707-001, 1(149.6 mm SL) collected with the preceding specimen. LACM 45541-1, 1(135.7 mm SL) collected with the preceding specimen. MMSU P-18834, 1(135.7 mm SL), Malagasy Republic (Madagascar), southwest coast, 22°19.1′S, 043°06.1′E, 2 December 1988, R/V VITYAZ, Cr. 17, St. 2644, 330–335 m. NMV A9963, 1(115.0 mm SL) collected with the preceding specimen. BMNH 1992. 3.25.32, 1(116.3 mm SL) collected with the preceding specimen.

Discussion.—The two new collections have resulted in considerable distribution extensions for this species. The M/V BEINTA collection provides a northward extension to the Horn of Africa and the R/V VITYAZ provides the first record from across the Mozambique Channel along the southwestern coast of Madagascar. The cleared and stained specimen has 12+20=32 vertebrae with the haemal arch on the 10th vertebrae. Hypurals 1 and 2 are fused, hypurals 3 and 4 are fused, hypural 5 is free. Three epurals are present. Pterygiophore interdigitation is the same as for *L. omanensis* and Baudelot's ligament originates on the anterior edge of the first vertebrae. The tips of each of the 6 gill rakers on the ceratobranchial bone of the first gill arch have a "ball" bearing tiny teeth. This species shares many characters with *L. alcocki* and is presumed to be its sister species. The two are easily separated by the presence of a strongly developed preopercular ridge in *L. multispinosa* which is absent in *L. alcocki*.

Lepidotrigla alcocki Regan, 1908
Tables 2–5

Lepidotrigla alcocki Regan 1908: 240 (original description). Richards and Saksena 1977: 208–221 (key, diagnosis, distribution). Richards 1984: unpaginated (illustration, characters, distribution).

New Material.—All from the Indian Ocean, Saya de Malha Bank. USNM 322089, 1(136.0 mm SL) 11°12′S 060°47′E, 22 September 1977, R/V PROFESSOR MESIATZEV, Cr. 6, Tr. 439, 150–164 m. MMSU P-18832, 1(129.5 mm SL) 11°06′S, 062°14′E, 7 January 1989. R/V VITYAZ Cr. 17, St. 2804, 235 m. MNHN 1992-220, 1(127.5 mm SL) 11°08′S 062°16′E, 7 October 1977, R/V PROFESSOR MESIATZEV, Tr. 476, 235–239 m. MCZ 98709, 1(126.0 mm SL) collected with preceding specimen. AMS I32708-001, 1(120.6 mm SL) collected with preceding specimen. NMV A9964, 1(114.6 mm SL) collected with preceding specimen. USNM 322090, 1(98.9 mm SL, cleared and stained) collected with preceding specimen. LACM 44799-1, 1(145.7 mm SL) 11°06′S, 062°14′E, 6 January 1989, R/V VITYAZ Cr. 17, St. 2795, 260–250 m. CAS 77308, 1(149.6 mm SL) collected with preceding specimen. RUSI 37576, 1(149.0 mm SL) collected with preceding specimen. FAKU 58829, 1(135.2 mm SL) collected with preceding specimen. MMSU P-18835, 1(129.3 mm SL) collected with preceding specimen. HUMZ 72330, 1(124.5 mm SL) 11°04′S 062°10′E, 31 August 1977, 187 m. HUMZ 72369, 1(137.2 mm SL) 11°16′S 061°02′E, 5 September 1977, 148 m. HUMZ 73684, 1(121.7 mm SL) 10°59′S 061°02′E, 5 September 1977, 126 m. CAS 44800-1, 3(114.7–139.1 mm SL) 11°06′S 062°14′E, 7 January 1989, R/V VITYAZ St. 2804.

Discussion.—This species was previously known from the lectotype and paralectotype collected at Saya de Malha Bank. The material listed above is from several

Soviet cruises and one Japanese to the same and only known locality for this species. This species is a sister species to *L. multispinosa,* as noted above. Additional meristic data are given in Tables 2 to 5. These specimens are very similar to the lectotype and paralectotype and were directly compared with the lectotype. Richards and Saksena (1977) incorrectly reported that the nape lacked scales. All the material examined had scales on the nape. The cleared and stained specimen has Baudelot's ligament originating on the anterior edge of the first vertebra, the first closed haemal arch is on the 10th vertebra and there were 11+21+32 vertebrae. Hypurals 1 and 2 are fused, hypurals 3 and 4 are fused, hypural 5 is free. Three epurals are present. I did note the presence of a small spine on the medial edge of the nasal bone. Examination of the material revealed its presence on all but two specimens, though it occurred only on one side in many. The spine is very minute and difficult to discern from the rugose nature of the head bones. One x-rayed specimen with 12+21=33 vertebrae has no discernible spine associated with the last first dorsal pterygiophore and an interdigitation pattern with the first pterygiophore between the second and third neural spines, the next two between the third and fourth neural spines and the only other interneural space with two pterygiophores located between the 13th and 14th neural spines. The first anal pterygiophore precedes the haemal spine on the 12th vertebra and the next two pterygiophores are in the next interhaemal space. On most of the other species examined the first three anal pterygiophores precede the first haemal spine. The types were collected at 225 m and the new material was collected from 150 to 260 m.

Color.—Photographs of the HUMZ specimens show a red blotch in the first dorsal fin between the 4th and 6th spines. The heads and dorsums are reddish with one specimen (HUMZ 72369) with red on the lower sides and an appearance of light blotches below the second dorsal fin and on the caudal peduncle. There is a pale red submarginal band on the second dorsal fin on all the specimens.

Lepidotrigla jimjoebob new species
Figures 4-6, Tables 4-5

Diagnosis.—A species of *Lepidotrigla* with a small, rudimentary barbel or papilla on each side of the mandibular symphysis on the posterior ventral margin of the lower jaw posterior to the lip; rostral process with several short spines, none blade-like; nasal spines present; pectoral fin of moderate length (35.8% SL); scales weakly attached; nape scaled; prepectoral, breast, and interpelvic area naked; belly scaled; 62 lateral line scales, 21 scale rows below the lateral line, 9 first dorsal fin spines, 16 second dorsal fin rays, 16 anal fin rays, 12+20=32 vertebrae.

Holotype.—BPBM 24881, 116.3 mm SL, Pacific Ocean, Line Islands, southwest of Christmas Atoll, 01°50'S, 157°30'W, 20 February 1973. R/V TOWNSEND CROMWELL Cr. 62, St. 72, dredge, 183 m.

Description.—Meristic data are as follows: 9 dorsal fin spines with the first 3 serrate; 16 second dorsal fin rays; 16 anal rays, the first short and spine-like; 11 joined and 3 free pectoral fin rays; pelvic fins with one spine and 5 rays; caudal fin with 13 principal rays (7 dorsal, 6 ventral), and 9 upper and 9 lower secondary rays; 25 bucklers along base of dorsal fin; 6 short (1 mm) tuberculate gill rakers on the first ceratobranchial; and 2 short tuberculate gill rakers on the first hypobranchial; 62 lateral line scales with the lateral line bifurcate on the caudal fin; lateral line scales with three tubes, 5 scale rows above the lateral line and 21 rows below; body scales ctenoid but loosely attached with most lost. Nape and belly

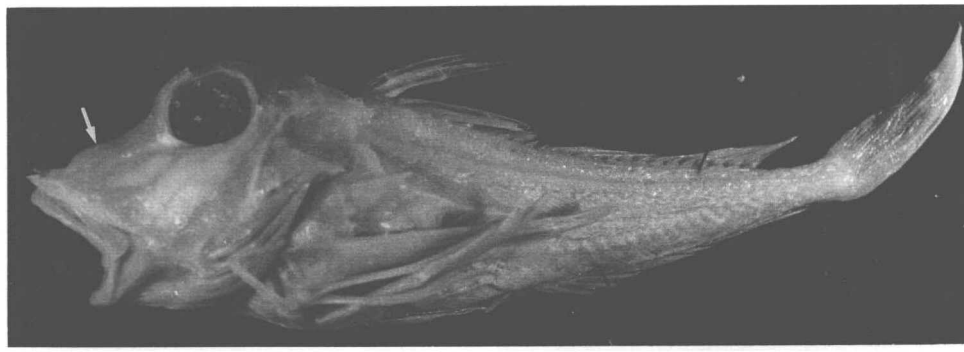

Figure 4. Lateral view of the holotype of *Lepidotrigla jimjoebob* BPBM 24881, 116.3 mm SL. Arrow points to the nasal spine.

with scales, prepectoral, breast, interpelvic area naked. Spination: first infraorbital (rostral) spine produced with several small spines, none blade-like (type L); nasal spine small, 2 supraocular spines, 1 postocular spine, postorbital groove present, parietal and pterotic spines present, strong ridge on posttemporal (nuchal) spines, cleithral spine strong, opercle and preopercle each with one spine, preopercular ridge weak but with a small spine posteriorly. Premaxillary, mandibles, and head of vomer toothed. One short barbel (0.7 mm) with a terminal pore on each side of the mandibular symphysis on the posterior margin of the lower jaw. From x-radiograph: 12+20=32 vertebrae; hypurals 1 and 2 fused, hypurals 3 and 4 fused, 5th hypural free, 3 epurals present, pterygiophore neural spine interdigitation—first pterygiophore between 2nd and 3rd neural spines, 3rd and 4th pterygiophores between 3rd and 4th neural spines, all other interdigitation single except

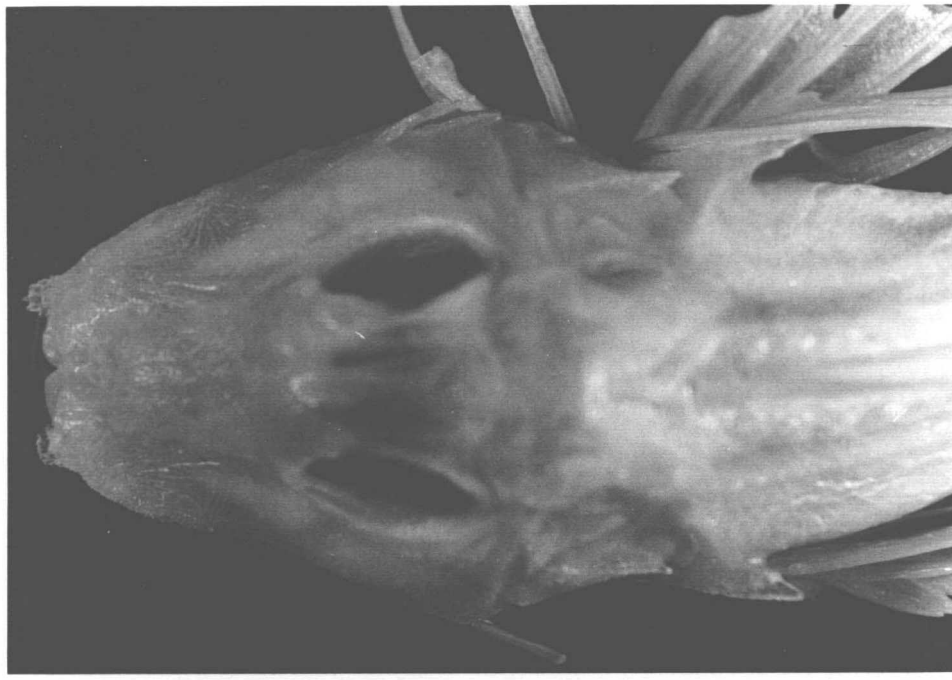

Figure 5. Dorsal view of the head of the holotype of *Lepidotrigla jimjoebob*.

Figure 6. Ventral view of the lower jaw of *Lepidotrigla jimjoebob.* Arrows point to the rudimentary barbels.

2 pterygiophores between 13th and 14th neural spines; first 3 anal pterygiophores in advance of haemal spine on 13th vertebra, remaining interdigitation single.

Color in Alcohol.—Body pale with grey pigmentation on inner surface of mid-pectoral joined rays. Few scattered black melanophores on inner wall of body cavity. No black spot visible on first dorsal fin. Measurements in mm (%SL in parentheses): 116.3 mm SL, head length 41.4 (35.6), snout length 16.6 (14.3), rostral spine length 2.2 (1.9), orbital diameter 11.9 (10.2), interorbital width 7.5 (6.4), first dorsal spine length 18.5 (15.9), second dorsal spine length 19.8 (17.0), pectoral fin length 41.7 (35.8), first free pectoral ray length 32.2 (27.7), cleithral spine length 15.1 (13.0), body depth at first dorsal spine 33.1 (28.5), caudal peduncle depth 5.9 (5.1).

Etymology.—The name is a noun in apposition formed from an arbitrary combination of letters of my sons', James, Joseph and Robert, nicknames.

Discussion.—This description is based on one specimen, but its possession of barbels and nasal spines is so distinctive that there is no doubt that this species merits recognition as a separate species. It is the first *Lepidotrigla* to be found in the central Pacific. Other Pacific species of this genus are known only from the western Pacific around Australia, New Guinea, Philippines, and Japan. This disparity is probably due to the lack of dredging around central Pacific islands. Robins (1991) discusses a similar distributional pattern in relation to ophidiids. He notes that one ophidiid, *Ophidion muraenolepis,* is common to Hawaii and the Arafura Sea with no intervening localities presumably due to the lack or difficulty of collecting in the rugged topography around atolls and volcanic islands.

Besides this new species only one other triglid is reported that is nonmarginal from the Pacific Plate. It is *Chelidonichthys kumu* (Lesson, 1830) reported by Pietschmann (1930) from Hawaii, but considered to be a possible error by Springer (1982). I have seen Pietschmann's specimen in the Bishop Museum in Honolulu (BPBM 3463) and the identification is correct. *Pterygotrigla picta* (Gunther, 1880) is known from New Zealand and from the type locality at Juan Fernandez Island and also at San Felix Island and nearby guyots, the last localities on the Nazca Plate. (However, the New Zealand specimens may be a separate species, *P. andertoni* Waite, 1910). At least two other *Pterygotrigla* species have been taken in the Marianas which closely shows that this genus crosses deep (Marianas Trench) or long (across the Pacific Plate) barriers with ease. The lack of records is due to difficulty of collecting in these rugged habitats. The peristediids are basically restricted to the margins of the Pacific Plate, but two are found at Hawaii—*Satyrichthys hians* (Gilbert and Kramer, 1897) and *S. engyceros* (Gunther, 1871). A peristediid, *Satyrichthys quadratorostratus* was described recently from Îles des Pins, southeast of New Caledonia, but incorrectly placed in the genus *Peristedion* by the authors, Fourmanoir and Rivaton (1979). This locality is on the Indo-Australian Plate near the Pacific Plate edge. Other peristediids have been taken in the Marshall and Marianas islands on the eastern edge of the Philippine Plate. Peristediids are generally found at greater depths than triglids, but both have pelagic larvae which may be capable of long distance transport. Future collecting will undoubtedly yield more species and clearer distribution patterns.

Diagnostic Characters of *Lepidotrigla*

The clearing and staining of specimens of several species of this genus plus a review of radiographs has yielded some information which will assist in the development of taxonomic understanding of the genus and shed light on its relation to other triglid genera. It is still premature to assign polarities to characters, but differences and similarities within the genus based on species examined to date are presented. As many more species need to be studied, it is hoped that other investigators will include information on these characters in their studies.

Triglids (excluding peristediids) are separable into three basic groups (Miller and Richards, 1991). One, comprising *Prionotus* and *Bellator,* is confined to the coasts of North and South America in temperate and tropical zones. Characters present in this group include proximal radials not expanded to form any visible bony structure along the dorsal fin base, 26 vertebrae, first closed haemal arch on the 7th or 8th vertebra, scapular foramen anteriorly bordered by the cleithrum, 10 or 11 dorsal fin spines, 11–13 dorsal fin soft rays, 11–12 anal fin rays, 12–14 joined pectoral fin rays, 17 principal caudal rays (rarely 15 or 16), lateral line not bifurcate on tail, two pterygiophores each interdigitating between the second and third and third and fourth neural spines, vomer and palatines with teeth, and Baudelot's ligament originating on the skull.

Pterygotrigla and its relatives (*Uradia* and *Parapterygotrigla*) are Indo-Pacific genera usually from deep water and, with few exceptions, are known from only a few specimens. They have expanded proximal radials forming flattened plates along the first dorsal fin base, 27 vertebrae, scapular foramen entire, two pterygiophores each interdigitating between the second and third and third and fourth neural spines, vomer toothed or not, palatines without teeth, and first closed haemal arch on 9th or 10th vertebra. T. Yato and I are currently revising these genera and additional comments on its characters must await completion of that study.

Lepidotrigla shares with the remaining triglid genera, *Chelidonichthys* and *Trigla,* the presence of expanded proximal radials forming bucklers (most with posteriorly directed spines) along the entire base of the first and second dorsal fins, an entire scapular foramen, more than 28 vertebrae, one pterygiophore interdigitating between the 2nd and 3rd neural spines and two between the 3rd and 4th neural spines, hypurals 1 and 2 fused together and to the ural centrum, hypurals 3 and 4 fused together and to the ural centrum, hypural 5 free and not fused to the adjoining hypural or ural centrum, 3 epurals present, lateral line bifurcate on the tail, and first closed haemal arch on the 9th or 10th vertebra (may be 11th or 12th on some *Chelidonichthys*). Within *Lepidotrigla* some variation has been found on almost all characters, for example: first dorsal spines serrate or smooth, Baudelot's ligament originating on the skull or first vertebra, variable numbers of vertebrae, fin rays, and number of lateral line scales, variation in extent of chest (breast) squamation, differences in rostral spines shape (see Fig. 1) and development, presence or absence of a postorbital groove, and different interdigitation formats of the pterygiophores. A survey of 45 species for these characters is given in Tables 4 and 5, but is not a complete compilation as not all species have been surveyed. Some characters are unique for just a few species; intended for example, presence of breast scales in only seven species, smooth first dorsal spines only in *L. cadmani,* and lack of postorbital groove in only two species. In the two species described as new in this study, the presence of a long opercular spine in *L. sayademalha* and the presence of barbels and nasal spines in *L. jimjoebob* are also unique. Nasal spines were only seen in *L. jimjoebob* and *L. alcocki. L. calodactyla* has barbels, but no nasal spines. It also has papillae on the mandible, a feature not observed in any other *Lepidotrigla.* A feature which may indicate intrageneric relations is the nature of the rostral process. Several types are seen as described in Richards and Saksena (1977) and depicted here in Figure 1—the single blade-like process (type P), the subequal spines process (type L), the produced process (type M), and the lack of a process (type O). Intermediate conditions of these types have been observed in some species.

In reviewing other characters, the two species lacking a postorbital groove, *L. microptera* and *L. vanessa* (groove present in small specimens according to M. Gomon, pers. comm.), also have small scales which make these species more similar to *Chelidonichthys.* The nature of the body scales was difficult to evaluate in many specimens. Those species with the firm scale condition seem to retain these scales even when roughly handled during collecting, but all the others may have some variation in condition of weak (deciduous) attachment which cannot be accurately determined due to poor preservation or collecting conditions. Those with high vertebral counts have higher numbers of second dorsal rays, anal rays, and more posteriad position of the double inserted pterygiophore as might be expected.

Life colors may be important diagnostic characters as described by Shindo (1951) for pectoral fins. Coleman (1980) states that his observations of Australian triglids show that they change color rapidly when threatened and are red in death, but are not necessarily red in life. Unfortunately, few color illustrations have been published. The color photo labeled as *L. vanessa* in Coleman (1980) shows a fish with a postorbital groove, but the type of that species lacks a postorbital groove; thus this species should probably be labeled *L. papilio.* Unfortunately, semi-popular books such as that by Coleman (1980) have excellent color photos, but voucher specimens are not extant. Two recent books (Sainsbury et al., 1985; and Gloerfelt-Tarp and Kailola, 1985) have good color photos and the specimens were deposited in museums and fully documented. An important color character may

Table 6. List of nominal species of Lepidotrigla from the Indo-Pacific. Abbreviations: Pax et al. 1989 = Paxton et al., 1989; R & S 1977 = Richards and Saksena, 1977; J, T & S 1913 = Jordan et al., 1913; M & H 1932 = Matsubara and Hiyama, 1932; McCull 1929 = McCulloch, 1929; Stein & Dod 1887 = Steindachner and Doderlein, 1887; O & Y, 1984 = Ochiai and Yatou, 1984

Species	Describer, date	Current status	Distribution
abyssalis	Jordan & Starks, 1904	valid, nom. nov. for *japonica* Nystrom	Japan to east E. China Sea
alata	(Houttuyn, 1782)	valid	Japan to northern S. and E. China Sea
alata	Jordan & Richardson, 1908	(not *alata* Houttuyn) =*paradoxa* M & H 1932)	Japan
alcocki	Regan, 1908	valid	Saya de Malha Bank
altivelis	Matsubara & Hiyama, 1932	syn. of *microptera* (Yato, pers. comm.)	Japan
argus	Ogilby, 1910	valid	Australia
argyrosoma	Fowler, 1938	valid	Philippines
bentuviai	Richards & Saksena, 1977	valid	Somalia, Gulf of Aden
bispinosa	Steindachner, 1898	valid	Arabian Sea, Red Sea, Persian Gulf
brachyoptera	Hutton, 1872	valid	New Zealand
brevispinis	Matsubara & Hiyama, 1932	syn. of *microptera* (Yato, pers. comm.)	Japan
burgeri	Temminck & Schlegel, 1843	syn. of *alata,* see J, T & S 1913	Japan
calodactyla	Ogilby, 1910	valid	Australia
deasoni	Herre & Kauffman, 1953	valid	Philippines
eydouxi	Sauvage, 1878	valid	Philippines
faueri	Gilchrist & Thompson, 1914	valid	E. Africa to India
grandis	Ogilby, 1910	valid, Gomon (pers. comm.)	Australia
guentheri	Hilgendorf, 1879	valid	Japan to E. China Sea
hime	Matsubara & Hiyama, 1932	valid	Japan, E. China Sea
japonica	(Lacepède, 1802)	syn. of *alata* Hou., see McCull 1929	Japan
japonica	(Bleeker, 1857)	valid, but homonym of Lacepède	Japan to E. & northern S. China Sea, Indonesia
japonica	Steindachner & Doderlein, 1887	syn. of *japonica* (Bleeker)	Japan
japonica	Nystrom, 1887	homonym, *abysallis* nom. nov.	Japan
jimjoebob	new species	valid	Christmas Atoll, Line Islands
kanagashira	Kamohara, 1936	valid, see O & Y, 1984 not syn. of *japonica* Kuronuma 1939 wrong	Japan, S. China Sea
kishinouyei	Snyder, 1911	valid	Japan to northern E. China Sea
lepidojugulata	Li, 1981	valid	northern S . China Sea
longifaciata	Yatou, 1981	valid	E. China Sea Japan
longimana	Li, 1981	valid	northern S. China Sea
longipinnis	Steindachner & Doderlein, 1887	syn. of *guentheri,* see J, T & S, 1913	Japan
longipinnis	Alcock, 1890	homonym of *longipinnis* Stein & Dod 1887	India

Table 6. Continued

Species	Describer, date	Current status	Distribution
macrobrachia	Fowler, 1938	valid	Philippines
marisinensis	Fowler, 1938	valid	Philippines & northeastern China Sea
microptera	Gunther, 1873	valid	Japan to E. China & Yellow-Po Seas
modesta	Waite, 1899	valid	Australia
mulhalli	Macleay, 1884	valid	Australia
multispinosa	Smith, 1934	valid	E. Africa & Madagascar
natalensis	Gilchrist & Thompson, 1914	syn. of *faueri*, see R & S 1977	E. Africa
oglina	Fowler, 1938	valid	Philippines & northern S. China Sea
omanensis	Regan, 1905	valid	Arabian Sea
papilio	(Cuvier, 1829)	valid	Australia
paradoxa	Matsubara & Hiyama, 1932	syn. of *alata* Hou., see Kuronuma 1939	Japan
pectoralis	Fowler, 1938	valid	Philippines
phalaena	Cuvier, 1829	syn. of *papilio*, see Pax et al. 1989	Australia
pleuracanthica	(Richardson, 1845)	syn. of *papilio*, see McCull 1929	Australia
punctipectoralis	Fowler, 1938	valid	Australia & Philippines Japan to China Sea
riggsi	Richards & Saksena, 1977	valid, nom. nov. for *longipinnis* Alcock	India & Andaman Sea
sayademalha	new species	valid	Saya de Malha Bank
serridens	Hilgendorf, 1879	syn. of *microptera*, see M & H 1932	Japan
smithii	Regan, 1905	syn. of *kishinouyei*, see Kuronuma 1939 syn. *strauchi*, see J, T & S 1913	Japan
sphinx	Cuvier, 1829	syn. of *papilio*, see Pax et al., 1989	Australia
spiloptera	Gunther, 1880	valid	E. Africa, Australia, S. China Sea
spinosa	Gomon, 1987	valid	Australia
stigmapteron	Fowler, 1934	syn. of *faueri*, see R & S, 1977	E. Africa
strauchi	Stendachner, 1876	syn. of *microptera*, see Kamohara, 1952	Japan
teraoi	Matsubara & Hiyama, 1932	syn. of *guentheri*, see Kuronuma, 1939	Japan
truncata	Matsubara & Hiyama, 1932	syn. of *microptera*, see Kuronuma, 1939	Japan
umbrosa	Ogilby, 1910	valid	Australia
vanessa	Richardson, 1839	valid	Australia
venusta	Fowler, 1938	valid	Philippines
vergeri	Saville-Kent, 1893	nom. nud.	Australia

be the presence of a red or black spot in the first dorsal fin. Several species have this feature, but only a black spot can be seen in preserved specimens. In my review it was very difficult to note the presence or absence of this black spot in old museum specimens or in specimens roughly treated with torn interspinous membranes. The presence of this spot plus the pectoral fin color in males, together with other color features, should be noted by collectors.

In the Indo-Pacific there are 61 nominal species of which 37 are probably valid,

two may be valid, and the remainder are invalid (Table 6). Many of these species have not been directly compared with one another; thus there may be more synonyms, but several species have not been identified and more may be described. The species currently known as *L. japonica* Bleeker needs to be investigated as it appears to be homonym of *japonica* Lacepède. Once all species have been thoroughly studied and all characters evaluated, the genus can be accurately diagnosed.

Additional Material Examined.—*L. brachyoptera*: NMNZ P20947(3), P20926(2), P26482(2), *L. argus*: AMS I12532 (syntype); *L. grandis* AMS I12512 (syntype); *L. umbrosa* AMS I12522 (syntype); *L. pleuracanthica*: BMNH 1855.9.19.86-7 (syntypes); *L. papilio*: MNHN 6917 (holotype); *L. phalaena*: MNHN 6912 (holotype); *L. sphinx*: MNHN 6913 (holotype); *L. vanessa*: BMNH 1855.9.19.79 (holotype); *L. abyssalis*: USNM 51440 (holotype); *L. kishinouyei*: USNM 68241 (holotype), USNM 74584 (paratype); *L. venusta*: USNM 98872 (holotype); *L. deasoni*: USNM 202504 (holotype); *L. alata*: USNM 151795 (1), USNM 192871 (4), USNM 59663 (1), USNM 72143 (1), USNM 64654 (2), SIO 64-258-56B (1); *L. argyrosoma*: USNM 98873 (holotype); *L. pectoralis*: USNM 98828 (holotype); *L. macrobrachia*: USNM 98882 (holotype); *L. punctipectoralis*: USNM 98871 (holotype); *L. oglina*: USNM 98865 (holotype); *L. microptera*: USNM 22575 (1), USNM 86457(1), BMNH 1873.7.30.3 (holotype), SIO 64-257-1-56B (1); *L. calodactyla*: AMS I12533 (syntype), SIO 66-525 (1); *L. guentheri* USNM 152471 (1), USNM 98983 (1); *L. marisinensis* USNM 98867 (holotype); *L. mulhalli*: USNM 177174 (1); *L. modesta* AMS I3956-7 (syntypes), USNM 177179 (1); *L. smithii*: BMNH 1905.6.6.299-303 (syntypes); *L. alcocki*: BMNH 1908.3.23.212-213 (lectotype and paralectotype).

Acknowledgments

I thank Dr. Y. Shcherbachev for loan of the Soviet material and the suggestion to distribute it to several museums. I also thank Dr. L. W. Knapp for providing material from the Smithsonian Oceanographic Sorting Center, Dr. K. Amaoka for the loan of specimens from Hokkaido University's collections, together with color photographs, at Saya de Malha Bank, and R. Feeney for the loan of LACM material. R. H. Rosenblatt, C. Paulin, J. M. Leis, H. J. Walker, E. A. Lachner, M. McGrouther, G. D. Johnson, P. J. P. Whitehead, A. Wheeler, J. R. Paxton, N. Merrett, C. R. Robins, A. Stewart, and M. L. Bauchot kindly allowed access to their collections. Ms. C. Yeung kindly translated Chinese literature for me. Mr. J. C. Javech made photographs and illustrations, Dr. W. R. Courtenay, Jr. made x-ray facilities available. I especially thank C. R. Robins, M. Gomon, P. Heemstra, and T. Yato for reviewing the manuscript and providing valuable comments.

Literature Cited

Blegvad, H. 1944. Fishes of the Iranian Gulf. Dan. Sci. Invest. Iran 3: 247.

Coleman, N. 1980. Australian sea fishes south of 30°S. Doubleday Australia, N.S.W. 302 pp.

De Beaufort, L. F. 1962. Scleroparei. Pages 1–177 *in* M. Weber and L. F. De Beaufort, eds. The fishes of the Indo-Australian Archipelago, Vol. 11. E. J. Brill, Leiden.

Fourmanoir, P. and J. Rivaton. 1979. Poissons de la pente recifale externe de Nouvelle-Caledonie et des Nouvelles-Hebrides. Cah. Indo-Pacif. 1(4): 405–443.

Gomon, M. F. 1987. New Australian fishes. Part 6. New species of *Lepidotrigla* (Triglidae), *Choerodon* (Labridae) and *Zebrias* (Soleidae). Mem. Mus. Vict. 48(1): 17–23.

Gloerfelt-Tarp, T. and P. J. Kailola. 1985. Trawled fishes of southern Indonesia and northwestern Australia. Australian Development Assistance Bureau, Australia. 406 pp.

Heemstra, P. C. 1982. Taxonomic notes on some triglid and peristediid fishes (Pisces: Scorpaeniformes) from southern Africa. Copeia 1982: 291–295.

———. 1986. Family No. 157: Triglidae. Pages 486–488 *in* M. M. Smith and P. C. Heemstra, eds. Smith's sea fishes. Macmillan South Africa, Johannesburg. 1,047 pp.

Hubbs, C. L. and K. F. Lagler. 1958. Fishes of the Great Lakes region. Bull. Cranbrook Inst. Sci. (26): 1–213.

Jordan, D. S., S. Tanaka and J. O. Snyder. 1913. A catalogue of the fishes of Japan. Jour. Coll. Sci. Imp. Univ. Japan. 33(1): 1–497.

Kuronuma, K. 1939. A study of the Triglidae of Japan. Bull. Biogeogr. Soc. Japan 9(14): 223–260.

Leviton, A. E., R. H. Gibbs, Jr., E. Heal and C. E. Dawson. 1985. Standards in herpetology and ichthyology: Part 1. standard symbolic codes for institutional resource collections in herpetology and ichthyology. Copeia 1985(3): 802–832.

Li, X. Z. 1981. Two new *Lepidotrigla* species from the South China Sea. Zool. Res. 2(4): 295–299 (In Chinese)

Matsubara, K. and Y. Hiyama. 1932. A review of Triglidae, a family of mail-cheeked fishes, found in the waters around Japan. Jour. Imp. Fish. Inst., Tokyo. 28: 3–67.

McCulloch, A. R. 1929. A check-list of the fishes recorded from Australia. Mem. Aust. Mus. 5(1–4): 1–534.

Miller, G. C. and W. J. Richards. 1991. Revision of the western Atlantic and eastern Pacific genus *Bellator* (Pisces:Triglidae). Bull. Mar. Sci. 48: 635–656.

Norman, J. R. 1939. Fishes. Scient. Rep. John Murray Exped. 7. 116 pp.

Ochiai, A. and T. Yatou. 1984. Family Triglidae. Pages 333–334, plates 299–300, 364 *in* H. Masuda, K. Amaoka, C. Araga, T. Uyeno, and T. Yoshino, eds. The fishes of the Japanese Archipelago. Tokai Univ. Press, Tokyo. 437 pp., 370 pls.

Paxton, J. R., D. F. Hoese, G. R. Allen and J. E. Hanley. 1989. Pisces. Petromyzontidae to Carangidae. Zoological catalogue of Australia. 7. 591 pp.

Pietschmann, V. 1930. Remarks on Pacific fishes. Bull. Bernice P. Bishop Museum (73). 24 pp., 3 pls.

Regan, C. T. 1905. On fishes from the Persian Gulf, the Sea of Oman, and Karachi, collected by Mr. F. W. Townsend. J. Bombay Nat. Hist. Soc. 16: 318–333.

———. 1908. Report on the marine fishes collected by Mr. J. Stanley Gardiner in the Indian Ocean. Trans. Linn. Soc. Lond. 2nd Ser. Zoology 12: 217–255.

Richards, W. J. 1984. Triglidae *in* Western Indian Ocean, Fishery Area 51. FAO Species Identification Sheets, Vol. 5. Unpaginated.

——— and V. P. Saksena. 1977. Systematics of the gurnards, genus *Lepidotrigla* (Pisces, Triglidae), from the Indian Ocean. Bull. Mar. Sci. 27: 208–222.

——— and ———. 1991. Triglidae. Pages 680–684 *in* J. C. Quero, J. C. Hureau, C. Karrer, A. Post, and L. Saldanha, eds. Clofeta. Check-list of the fishes of the eastern tropical Atlantic, Vol. 2. UNESCO, Paris.

Robins, C. R. 1991. Two new species of *Ophidion* (Pisces: Ophidiidae) from remote islands of the eastern Pacific. Contrib. Sci. Nat. Hist. Mus. Los Angeles Cty. No. 427: Pp. 1–11.

Sainsbury, K. J., P. J. Kailola and G. G. Leyland. 1985. Continental shelf fishes on northern and north-western Australia. CSIRO Division of Fisheries Research, Australia. 375 pp.

Shindo, S. 1951. Studies on the stock of *Lepidotrigla* of the Eastern Sea. (I). On the specific characteristics. Bull. Jap. Soc. Scient. Fish. 17(3): 83–90.

Smith, J. L. B. 1934. The Triglidae of South Africa. Trans. R. Soc. S. Afr. 32: 321–336.

———. 1949. The sea fishes of southern Africa. Central News Agency, Ltd. Cape Town, South Africa. 550 pp.

Springer, V. G. 1982. Pacific Plate biogeography, with special reference to shorefishes. Smithsonian Contrib. Zool. (367). 182 pp.

DATE ACCEPTED: April 27, 1992.

ADDRESS: *NOAA/National Marine Fisheries Service, Southeast Fisheries Science Center, 75 Virginia Beach Drive, Miami, Florida 33149.*